

REMARKS

1. Preliminary Remarks

a. Status of the Claims

Claims 66-103 are pending in the application. Claims 66, 67, 70, 74, 79, 82, 88, 93, 100 and 102 are amended. Applicant respectfully requests entry of the remarks and amendments made herein into the file history of the application. Upon entry of the amendments, claims 66-103 will be pending and under active consideration.

b. Amendments to the Claims

Claim 66 is amended to recite a method of separating solid particles from a suspension, comprising, *inter alia*, consolidating said solids-rich phase by facilitating said reversibly operable conditioning to liberate at least some liquid otherwise trapped among said solid particles; and separating said solids-rich phase from said liquids-rich phase. Support for the claims amendments may be found throughout the specification and claims as originally filed, for example, at pages 3 and 12.

Claim 67 is amended to recite a method of controlling consolidation of a bed of solid particles within a liquid including, *inter alia*, applying one or more stimuli to said bed, said one or more stimuli adapted to control inter-particle forces between said solid particles to form a conditioned state comprising a solids-rich phase and a liquids-rich phase; and separating said solids-rich phase from said liquids-rich phase. Support for these claim amendments may be found through the specification and claims as originally filed, for example, at pages 12 and 16.

Claims 70, 74, 79, 82, 88, 93, 100 and 102 are amended to correct typographical errors, provide antecedent basis for claim limitations, and to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Support for these claim amendments may be found through the specification and claims as originally filed. No new matter is added through these claim amendments.

c. Amendments to the Specification

On page 2 of the Office Action, the Examiner objects to the following typographical errors in the specification: on page 9 line 18 “hydroxyethy” should be changed to “hydroxyethyl”; on page 13 line 34 “sulfanate” and “polysulfanamide” should be changed to “sulfonate” and “polysulfonamide”; and on page 15 line 22 “ethelyne” should be changed to “ethylene”. Applicant

has amended the specification accordingly to correct these typographical errors. Applicant respectfully submits the objection is overcome through these amendments.

2. Patentability Remarks

a. 35 U.S.C. § 112, second paragraph

On page 2 of the Office Action, claims 66-103 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. The Examiner asserts that the following terms are vague and indefinites because it is unclear how these terms further limit the claims: “conditioned state” in claims 66 and 67, “may be” in claim 70, “maybe” in claim 79, “other polymers”, “such as” and “other related” in claim 88, “similar groups” in claim 93, and “Pluronics” in claim 100. The Examiner asserts that in claim 82 “sulfanate” and “polysulfanamide”, in claim 88 “hydroxyethyl”, and in claim 102 “polyethelyne” are erroneous, and should be changed to “sulfonate”, “polysulfonamide”, “hydroxyethyl” and “polyethylene”, respectively. The Examiner asserts that in claim 66 “the condition”, in claim 67 “the consolidation”, and in claim 74 “the light stimulus” lack clear antecedent basis. The Examiner further asserts that claims 66 and 67 are incomplete because it is essential the instant methods include steps for forming a solids-rich phase and liquids-rich phase, and for separating the solids-rich phase from the liquids-rich phase. The Examiner asserts that claim 90 is incomplete because it is essential that the chemical additive be utilized with a specific wavelength of light.

Claim 66 has been amended to delete “the condition”; claim 67 has been amended to replace “the consolidation” with “consolidation”; and claim 74 has been amended to replace “said light stimulus” with “said change of wavelength of light”, thereby rendering the rejections for lack of antecedent basis moot. Claims 66 and 67 have been further amended to clarify “conditioned state” as comprising a solids-rich phase and a liquids-rich phase; and have been further amended to recite that the methods include forming a conditioned state comprising a solids-rich phase and a liquids-rich phase, and separating said solids-rich phase from said liquids-rich phase, thereby clarifying the claims and overcoming the rejections. Claims 70, 79, 88, 93, and 100 have been amended to remove “may be” in claim 70, “maybe” in claim 79, “other polymers”, “such as” and “other related” in claim 88, “similar groups” in claim 93, and “Pluronics” in claim 100, thereby rendering the rejection moot with respect to these terms. The terms “sulfanate” and “polysulfanamide” in claim 82, “hydroxyethyl” in claim 88, and “polyethelyne” in claim 102 have been changed to “sulfonate”, “polysulfonamide”, “hydroxyethyl” and “polyethylene”, respectively, thereby rendering the rejection moot with respect to these terms.

With respect to claim 90, Applicant respectfully disagrees with the Examiner's assertion that claim 90 is incomplete because it is allegedly essential that the chemical additive be utilized with a specific wavelength of light. The Examiner has failed to provide any evidence that it is essential that the chemical additive be utilized with a specific wavelength of light. Rather, the specification provides that the stimulus may be by way of exposure to light, or the absence thereof, where preferably "the light includes wavelengths within the range of substantially ultraviolet to substantially visible," (emphasis added).¹ Accordingly, Applicant submits that the chemical additive can optionally be used with more than just a specific wavelength of light, and therefore there is no basis for requiring that the claims recite such a limitation.

In view of the foregoing amendments and remarks, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 66-103 under 35 U.S.C. § 112, second paragraph, as being indefinite.

b. 35 U.S.C. § 103(a)

Weiss

On page 3 of the Office Action, claims 66-75, 77-85, 96 and 103 are rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent No. 4,279,756 (hereafter "Weiss"). The Examiner asserts that Weiss discloses a method of controlling a suspension or a bed of solid particles substantially as claimed. The Examiner acknowledges that Weiss fails to disclose applying one or more stimuli to the suspension or bed to control inter-particle forces between solid particles, but asserts that addition of the coagulant/adsorbent, caustic soda, polyelectrolytes, and natural polymeric flocculants in Weiss would appear to apply a stimuli including a change in pH, that is patently indistinguishable from the stimuli applied in the instant claims. Therefore, according to the Examiner, it would have been obvious to the skilled artisan to modify Weiss by applying the recited stimuli, to aid in removing the solid particles from the suspension. With regard to claim 73, the Examiner asserts that the method of Weiss appears to be capable of operating with substantially visible light. With regard to claims 83-85, the Examiner asserts that the teaching of Weiss as applied above includes the use of acrylic acid polymers and polysaccharides such as starch, respectively. Applicant respectfully disagrees.

Weiss relates to a particulate coagulation/adsorbent for removing suspended impurities and colored substances from water by coagulation. The gel particles of Weiss are in the form of finely

¹ Specification, page 10, lines 3-5.

divided particulate mineral or clay materials, the individual particles of which have been treated to produce a thin hydroxylated surface layer having a positive zeta potential at the adsorption pH. Use of the Weiss gel particles includes adding the particles to a suspension of colloidal material. The colloidal material adsorbs to the larger sized gel particles and forms aggregates. The aggregates are removed from the clarified water and the colloidal material is subsequently washed off the larger (micron sized) gel particles using basic solution and water.

In contrast, the instant claims recite, *inter alia*, a method of separating solid particles from a suspension, comprising applying one or more stimuli to said suspension, consolidating a resulting solids-rich phase by facilitating reversibly operable conditioning to liberate at least some liquid otherwise trapped among said solid particles, and separating a resulting solids-rich phase from a resulting liquids-rich phase. As provided in the specification at page 12, line 24 through page 13, line 5, the instant method provides an advantage over the art in that the solids-rich phase may undergo consolidation by removing or reversing the stimulus which caused the attraction or repulsion between the solid particles. This allows any liquid remaining between the solid particles to be expressed and recovered. The resulting solid in form of a dewatered sediment, filter cake or thickener underflow should have favorable processing properties, such as for example a lower viscosity, which may result in improvements in pumping the dewatered product to the next process operations.

As noted in the specification at page 12, lines 28-29, at the time of filing it was not possible to recover such additional fluid trapped between solid particles by utilizing convention techniques, and therefore it stands to reason that it was not possible to obtain such a consolidated sediment, filter cake or thicker underflow having improved processing properties. Indeed, the Weiss method does not provide for further consolidation and liberation of liquid otherwise trapped among solid particles. Rather, as noted above, the colloidal materials removed from the liquids in Weiss are washed away (i.e., reinstated into a liquid) and the gel particles regenerated (*see, e.g., Weiss, Fig. 2*). There is no consolidation step. The instantly claimed method provides for the distinct advantage of obtaining a sediment bed, filter cake or thickening underflow largely devoid of liquid relative to those in the art, thus providing for improved processing thereof. In view of the foregoing, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 66-75, 77-85, 96 and 103 under 35 U.S.C. § 103(a) as being obvious over Weiss.

Weiss in view of Guillet

On page 3 of the Office Action, claims 86-89 are rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Weiss in view of U.S. Patent No. 4,536,294 (hereafter “Guillet”). The Examiner acknowledges that Weiss fails to disclose use of specific temperature-sensitive polymers, but asserts that Guillet discloses that it is known in the art to utilize the recited polymers to aid in flocculating clay fines and settling the flocculated clay fines from aqueous suspensions. Therefore, according to the Examiner, it would have been obvious to the skilled artisan to modify the method of Weiss in view of the teachings of Guillet to utilize the recited polymers to aid in removing the solid particles from the suspension. Applicant respectfully disagrees.

As demonstrated above, Weiss fails to teach or suggest consolidating a solids-rich phase by facilitating reversibly operable conditioning to liberate at least some liquid otherwise trapped among solid particles. Rather, the colloidal materials of Weiss are removed from the liquids via washings wherein the gel particles regenerated (*see, e.g.*, Weiss, Fig. 2), the process entirely lacking consolidation, as recited within the instant claims.

Guillet does not cure the deficiencies of Weiss. Guillet discloses the use of poly(NIPAM) and other temperature-sensitive polymers as flocculating agents, wherein the polymers exhibit a phenomenon known as critical flocculation temperature, which is a temperature below which they exhibit flocculating ability but above which they will not effect flocculation of solids suspended in aqueous liquids. However, nowhere does Guillet teach or suggest that additional consolidation will result by changing the temperature from above to below the lower critical solution temperature. Indeed, one advantage of the instant method is that additional consolidation can be obtained over the method of Guillet because the temperature can be altered to facilitate reversibly operable conditioning such that additional liquid can be recovered from the solid product. Both Weiss and Guillet completely fail to teach or suggest this claim limitation. In view thereof, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 86-89 under 35 U.S.C. § 103(a) as being obvious over Weiss in view Guillet

Weiss in view of Lissant

On page 4 of the Office Action, claims 97-102 are rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Weiss in view of U.S. Patent No. 3,194,758 (hereafter “Lissant”). The Examiner acknowledges that Weiss fails to disclose the use of specific copolymers, but asserts that Lissant discloses that it is known in the art to utilize the recited copolymers to aid in agglomerating solids and settling the agglomerated solids from aqueous suspensions. Therefore, according to the

Examiner, it would have been obvious to the skilled artisan to modify the method of Weiss in view of the teachings of Lissant to utilize the recited copolymers to aid in removing the solid particles from the suspension. The Examiner further asserts that the specific block or comb copolymers utilized would have been an obvious matter of process optimization to one skilled in the art, depending on the specific suspension or bed treated and results desired. Applicant respectfully disagrees.

As demonstrated above, Weiss fails to teach or suggest consolidating a solids-rich phase by facilitating reversibly operable conditioning to liberate at least some liquid otherwise trapped among solid particles. Rather, the colloidal materials of Weiss are removed from the liquids via washings wherein the gel particles regenerated (*see, e.g.,* Weiss, Fig. 2), the process entirely lacking consolidation as recited within the instant claims.

Lissant does not cure the deficiencies of Weiss. Lissant relates to a method of agglomerating and removing finely divided solids from a liquid medium. Lissant discloses dissolving an oxyalkylated surfactant in a finely divided solid-liquid system, causing the surfactant to become insoluble therein so that the finely divided solids are agglomerated therein, and removing the agglomerated particles from the liquid by conventional methods of settling, filtration, centrifugation, etc. Nowhere in Lissant is there disclosed that additional consolidation will result by cooling the suspension below the “cloud point”. As described above, the instant methods require consolidating a solids-rich phase by facilitating reversibly operable conditioning to liberate at least some liquid otherwise trapped among solid particles in the solids-rich phase. Both Weiss and Lissant completely fail to teach or suggest this claim limitation. In view thereof, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 97-102 under 35 U.S.C. § 103(a) as being obvious over Weiss in view of Lissant.

3. Conclusion

Applicant respectfully submits that the instant application is in good and proper order for allowance and early notification to this effect is solicited. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the instant application, the Examiner is encouraged to call the undersigned at the number listed below.

Respectfully submitted,

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